

*what is claimed is:*

1. A transmitter for a portable radio communication apparatus comprising a modulator having a first port for inputting a baseband signal and a second port for inputting a local oscillator signal, and including means for rectifying the input local oscillator signal to provide a conductance waveform at a multiple of the local oscillator signal, and means for mixing the baseband signal with the conductance waveform at said multiple of the local oscillator signal frequency for up-converting the baseband signal to a radio frequency modulated carrier, the transmitter including means for controlling the gain of the modulator thereby to control the output level of the modulator.
2. A transmitter according to claim 1, wherein a local oscillator signal drives the switching means at a multiple of its frequency.
3. A transmitter according to claim 1, wherein the means for controlling the gain of the modulator comprises current control means.
4. A transmitter according to claim 1, wherein the modulator comprises two cross-coupled pairs of switching elements, wherein a signal input modulates the switching elements at a multiple of the local oscillator frequency.
5. A transmitter according to claim 4, wherein said two cross-coupled pairs of switching elements comprise two cross connected long tail pairs of bipolar transistors.
6. Apparatus for a sub-harmonic mixer, comprising switching means, a first port for inputting a baseband signal to the switching means to be up-converted, and a second port for inputting a local oscillator signal to drive the switching means at an even multiple of the local oscillator frequency for up-converting the baseband signal to transmission frequency.

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